

CLAIMS

1. A protective sheet for laser processing disposed at laser beam incident side of a workpiece when processing the workpiece by ultrasonic absorption ablation of laser beam.

2. The protective sheet for laser processing of claim 1, wherein the light transmissivity in laser beam absorption region is less than 50%.

3. The protective sheet for laser processing of claim 1 or 2, wherein the protective sheet has an adhesive layer provided on a base material.

4. The protective sheet for laser processing of claim 3, wherein the base material contains an aromatic polymer.

5. The protective sheet for laser processing of claim 4, wherein the ratio by weight of aromatic ring in repetition unit for composing the aromatic polymer is 41 wt% or more.

6. A protective sheet for laser processing used when processing a workpiece by ultrasonic absorption ablation of laser beam, wherein the protective sheet has at least an adhesive layer on a base material, the etching rate (etching speed / energy fluence) of the base material is $0.4 [(\mu\text{m}/\text{pulse})/(\text{J}/\text{cm}^2)]$ or more.

7. The protective sheet for laser processing of claim 6, wherein the base material contains aromatic polymer or silicone rubber.

8. A manufacturing method of laser processed parts comprising a step of disposing a protective sheet for laser processing as set forth in any one of claims 1 to 7 at the laser beam incident side of workpiece (1), a step of processing the protective

sheet for laser processing and workpiece by irradiating with laser beam (2), and peeling off the protective sheet for laser processing from the workpiece after processing (3).

9. The manufacturing method of laser processed parts of claim 8, wherein the workpiece is any one of sheet material, circuit board, semiconductor wafer, glass substrate, ceramic substrate, metal substrate, semiconductor laser light emitting or photo detecting element board, MEMS board, and semiconductor package.

10. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with 1 or more of ratio of extinction coefficient at ultraviolet region wavelength λ of the base material to extinction coefficient at ultraviolet region wavelength λ of workpiece (extinction coefficient ratio = extinction coefficient at ultraviolet region wavelength λ of base material of protective sheet for laser processing / extinction coefficient at ultraviolet region wavelength λ of workpiece), comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of the workpiece, a step of processing the protective sheet for laser processing and workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the workpiece after processing.

11. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with the extinction coefficient at ultraviolet region wavelength λ of the base material of 20 cm^{-1} or more, comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of metal material, a step of processing the protective sheet for laser processing and metal material by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the metal material after processing.

12. The manufacturing method of laser processed parts of claim 10 or 11,

wherein the ultraviolet region wavelength λ is 355 nm.

13. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with 1 or
5 more of ratio of density of the base material to density of workpiece (density ratio = density of base material of protective sheet for laser processing / density of workpiece), comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of the workpiece, a step of processing the protective sheet for laser processing and workpiece by irradiating with laser beam, and a step of
10 peeling off the protective sheet for laser processing from the workpiece after processing.

14. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with the density of the base material of 1.1 g/cm³ or more, comprising a step of adhering an
15 adhesive layer of the protective sheet for laser processing to the incident side of laser beam of metal material, a step of processing the protective sheet for laser processing and metal material by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the metal material after processing.

20 15. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with 1 or more of ratio of tensile strength of protective sheet for laser processing to tensile strength of workpiece (tensile strength ratio = tensile strength of protective sheet for laser processing / tensile strength of workpiece), comprising a step of adhering an
25 adhesive layer of protective sheet for laser processing to the incident side of laser beam of the workpiece, a step of processing the protective sheet for laser processing and workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the workpiece after processing.

30 16. A manufacturing method of laser processed parts by using a protective

sheet for laser processing having at least an adhesive layer on a base material, with the tensile strength of 100 MPa or more, comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of metal material, a step of processing the protective sheet for laser processing and metal material by
5 irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the metal material after processing.

17. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with less
10 than 1 of ratio of specific heat of the base material to specific heat of workpiece (specific heat ratio = specific heat of base material of protective sheet for laser processing / specific heat of workpiece), comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of the workpiece, a step of processing the protective sheet for laser processing and workpiece
15 by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the workpiece after processing.

18. The manufacturing method of laser processed parts of any one of claims 10, 13, 15, and 17, wherein the workpiece is any one of sheet material, circuit board,
20 semiconductor wafer, glass substrate, ceramic substrate, metal substrate, semiconductor laser light emitting or photo detecting element board, MEMS board, and semiconductor package.

19. The manufacturing method of laser processed parts of any one of claims
25 11, 14, and 16, wherein the metal material is semiconductor wafer or metal substrate.

20. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with 1 or more of ratio of refractive index at wavelength 546 nm of the base material to refractive
30 index at wavelength 546 nm of organic workpiece (refractive index ratio = refractive

index at wavelength 546 nm of base material of protective sheet for laser processing / refractive index at wavelength 546 nm of organic workpiece), comprising a step of adhering an adhesive layer of the protective sheet for laser processing to the incident side of laser beam of the organic workpiece, a step of processing the protective sheet for laser processing and organic workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the organic workpiece after processing.

21. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with refractive index at wavelength 546 nm of the base material of 1.53 or more, comprising a step of adhering an adhesive layer of the protective sheet for laser processing to the incident side of laser beam of inorganic workpiece, a step of processing the protective sheet for laser processing and inorganic workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the inorganic workpiece after processing.

22. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with less than 1 of total coupling energy ratio (total coupling energy ratio = total coupling energy A equivalent to minimum value among sums of coupling energy of one carbon atom in resin component for composing a base material and other atom coupled with the carbon atom / total coupling energy B equivalent to minimum value among sums of coupling energy of one carbon atom in material component for composing an organic workpiece and other atom coupled with the carbon atom), comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of the organic workpiece, a step of processing the protective sheet for laser processing and organic workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the organic workpiece after processing.

23. A manufacturing method of laser processed parts by using a protective sheet for laser processing having at least an adhesive layer on a base material, with total coupling energy A equivalent to minimum value among sums of coupling energy of one carbon atom in resin component for composing the base material and other atom coupled with the carbon atom of less than 800 kJ/mol, comprising a step of adhering an adhesive layer of protective sheet for laser processing to the incident side of laser beam of inorganic workpiece, a step of processing the protective sheet for laser processing and inorganic workpiece by irradiating with laser beam, and a step of peeling off the protective sheet for laser processing from the inorganic workpiece after processing.

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24. The manufacturing method of laser processed parts of claim 21 or 23, wherein the inorganic workpiece is any one of circuit board, semiconductor wafer, glass substrate, ceramic substrate, metal substrate, semiconductor laser light emitting or photo detecting element board, MEMS board, and semiconductor package.

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25. The manufacturing method of laser processed parts of any one of claims 10 to 24, wherein the base material contains aromatic polymer or silicone rubber.

26. The manufacturing method of laser processed parts of any one of claims 10 to 25, wherein the processing is cutting or drilling.

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27. A protective sheet for laser processing used in a manufacturing method of laser processed parts in any one of claims 10 to 26.